
Type 4: Large rivers in the alpine foothills

Distribution in river landscapes and regions according to Briem (2003):

Large coarse material floodplain (over 300 m wide)

Picture:



Inn (Bavaria). Photograph: Bavarian Water Management Agency (Lfw)

Short description of morphology:

Large streams with springs in the Alps. Dominant substrates are boulders, cobble, gravel and sand. Average grain size decreases continually downstream and the share of finer substrates increases. Suspended fine material can lead to turbid water during spates or high discharge periods. During floods, the entire channel bed is altered: strong discharge events move enormous amounts of cobbles and boulders despite relatively low stream slopes. The channel form becomes braided with anastomosing channels in narrow to wide u-shaped valleys. Lateral erosion occurs, numerous unvegetated islands and cobble bars form. This leads to a highly dynamic, winding, multiple channel river form, with very high structural diversity. Important structures also occur in the floodplain, including standing water bodies and connected temporary or permanent side arms. Besides braided sections, single channel reaches occur.

Abiotic profile:

Size class: 1.000 - 10.000 km² catchment area

Slope of the valley floor: > 2 ‰

Flow category:

Channel substrates: dominant substrates are cobbles, subordinate are boulders and gravel, while finer substrates occur in smaller shares

Physico-chemical water conditions:

calcareous

Conductivity [µS/cm]: 250 - 350

pH-value: 8,0 - 8,6

Alkalinity [°dH]:

Total hardness [°dH]:

Flow regime & hydrology:

Alpine flow regime with severe fluctuation over the year and strongly pronounced extreme flow conditions during spates or low-flow periods.

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Characterisation of the macroinvertebrate community: **Functional groups:** The macroinvertebrate community is very diverse: Demanding species in respect to abiotic parameters (current velocity, oxygen supply and water temperature) dominate the coenosis. Rheophile, stone-dwelling species are abundant. Besides these, species inhabiting smaller patches or gravel and sand occur. The share of epirhithral species is low.

Selection of type-specific species: Ephemeroptera: *Siphonurus lacustris*, *Baetis lutheri*, *Epeorus assimilis*, *Rhithrogena beskidensis*, *Ecdyonurus venosus*. Plecoptera: *Perlodes microcephalus*, *Perla grandis*, *Chloroperla tripunctata*, *Taeniopteryx schoenemundi*, *Rhabdiopteryx neglecta*, *Capnia nigra*, *Leuctra geniculata*, *Leuctra major*, *Leuctra inermis*. Odonata: *Onychogomphus forcipatus*, *Ophiogomphus cecilia*. Heteroptera: *Micronecta minutissima*, *M. poweri*. Coleoptera: *Bidessus delicatulus*, *Oreodytes septentrionalis*, *Stictotarsus duodecimpustulatus*, *Laccobius striatulus*, *Ochthebius exsculptus*, *O. metallescens*, *Hydraena minutissima*, *Elmis maugetii*, *Elmis rioloides*, *Limnius volckmari*, *Esolus parallelepipedus*, *Riolus cupreus*. Trichoptera: *Rhyacophila dorsalis*, *Glossosoma boltoni*, *Agapetus nimbulus*, *Hydropsyche guttata*, *Hydropsyche incognita*, *Allogamus auricollis*. Diptera: *Simulium variegatum*.

Characterisation of macrophyte and phytobenthos communities: **Selection of type-specific macrophyte species:** *Chara aspera*, *C. hispida*, *C. intermedia*, *Mentha aquatica* (submerged), *Juncus articulatus*, *Myriophyllum alterniflorum*, *Callitriche hamulata*, *Chiloscyphus polyanthos*, *Potamogeton alpinus*, *Ranunculus peltatus*.

Selection of type-specific diatom species: *Achnanthes biasoletiana*, *Amphora pediculus*, *Cocconeis placentula*, *Cymbella silesiaca*, *Cymbella sinuata*, *Denticula tenuis*, *Gomphonema olivaceum*, *Gomphonema pumilum*, *Gomphonema tergestinum*.

Characterisation of the fish fauna: Streams with cool water temperatures in summer support grayling region fauna, while warmer streams support a fauna typical for the barbel region. Characteristic are gravel-spawning species like grayling, barbel, and nase. Species endemic to the Danube region like huchen and sandsmelt occur. In the downstream reaches euryoecious species like roach, pike and perch become increasingly important. Among others, abandoned side arms support bream and rudd.

Comments: Longitudinal, biotic differentiation and local particularities should be considered in stream assessment.

Examples of typical streams **Macroinvertebrates:** Lech (Bavaria)
Macrophytes and phytobenthos: Lech (Bavaria)

Comparative literature (selection):